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Pope Branch Watershed Implementation Plan (WIP)

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FOREWARD

In July of 1999, the District submitted to EPA the Anacostia River Watershed Action Strategy (WRAS). EPA approved this document, and requested that any additional incremental funding be applied to projects outlined in the approved WRAS (now referred to as Watershed Implementation Plan (WIP)). In order for the District to receive incremental funding, EPA required that the WIP be updated to address the overall vision; to reflect progress that has been made in the implementation of the Anacostia WIP; and to add new information necessary to update the status of the plans. The Pope Branch WIP is intended to serve this purpose.

EXECUTIVE SUMMARY

Located in southeast Washington, DC, Pope Branch is a 1.6-mile first-order tributary of the Anacostia River. The entire stream lies within DC city boundaries, originating downstream of Fort Davis Drive and flowing in a northwesterly direction towards the Anacostia. A portion of this stream (1,700 linear feet or 20%) is piped beginning at the CSX railroad and ending at an outlet to the Anacostia (COG, 2003). The Pope Branch subwatershed encompasses a 248.5-acre area and is roughly bounded by Alabama Avenue to the east, Pennsylvania Avenue to the south, and Massachusetts Avenue to the north.

The heavily urbanized character of the Pope Branch watershed, and its consequent imperviousness, produce conditions for flashy and intense stream channel flows, even during the most moderate of storm events. The resulting hydrologic alterations to natural stream equilibrium have deteriorated the water quality of Pope Branch, and degraded natural habitat. As watershed analysis has revealed, the erosion of its stream banks during storm events is the primary cause of sedimentation within Pope Branch.

There are several other current threats to both water quality and the health of the riparian buffer in the Pope Branch watershed. These include nonpoint source water pollution from stormwater runoff, a failing sewer line that traverses segments of Pope Branch, and lack of riparian cover along portions of the stream. As a result of this, Pope Branch does not support swimmable or secondary contact recreation uses. The potential for sewage line leaks into Pope Branch has produced a human health risk as well. In addition to the degraded water quality, the lower part of Pope Branch is piped, serving as a barrier to fish passage upstream and preventing potential recreational and aesthetic enjoyment of the riparian habitat.

In order to achieve the vision of restoring the habitat, water quality and aesthetics of Pope Branch, three interconnected primary activities are envisioned for the Pope Branch watershed: Stormwater Runoff Reduction, Targeted Outreach and Development of Community Watershed Stewards, and Stream Restoration. Under each of these activities, the following goals have been established:

Stormwater Runoff Reduction Strategy:

Goal #1: **Work with DC government agencies, local organizations, and citizens located within the Pope Branch watershed to reduce the volume and improve the water quality of storm water flowing into the stream by encouraging the use of BMPs and LID design.**

Stream Restoration Strategy:

Goal #2: **Reduce nonpoint source loads by redesigning the stream channel using natural channel design. Design will address the issues of stormwater runoff and the resulting accelerated land and streambank erosion and improve bank integrity, water quality, and habitat quality.**

Goal #3: **Realign existing sewer line as part of the stream channel redesign to ensure that the line is no longer compromised by natural stream meandering.**

Goal #4: **Expand riparian forest buffer and protect the existing buffer from the impacts of invasive plant species.**

Targeted Community Outreach and Development of Community Watershed Stewards Strategy:

Goal #5: **In conjunction with other DC agencies and local non-profits, promote citizen involvement in restoration to help provide for the long-term protection of Pope Branch's natural resources.**

Goal #6: **To ensure relevance of outreach program and other watershed activities, conduct a yearly assessment of WIP implementation strategy and use adaptive management to update and revise management strategies if necessary.**

By implementing these goals, it is believed that significant water quality, habitat and park improvements in Pope Branch may be achieved to attain District of Columbia class B and class C designated use categories for the stream, and to improve the watershed as a whole. The restoration goals of Pope Branch tributary are closely aligned with those of the *Chesapeake 2000 Agreement* and with local governmental and nongovernmental initiatives. Its restoration is a milestone in the District's NPS Management Plan II.

1.0 DESCRIPTION OF POPE BRANCH

Located in southeast Washington, DC, Pope Branch is a 1.6-mile first-order tributary of the Anacostia River. The entire stream lies within DC city boundaries, originating downstream of Fort Davis Drive and flowing in a northwesterly direction towards the Anacostia. A portion of this stream (1,700 linear feet or 20%) is piped beginning at the CSX railroad and ending at an outlet to the Anacostia (COG, 2003). The stream and surrounding riparian forest are known as Pope Branch Park. Originally, this park land was managed by the National Park Service; however, in the early 1970's Pope Branch Park lands were split off from Fort Dupont Park and management authorities were transferred to DC Parks and Recreation. The piped portion of the stream is located under the Lower Anacostia Park, managed by the National Park Service.

The Pope Branch subwatershed encompasses a 248.5-acre area and is roughly bounded by Alabama Avenue to the east, Pennsylvania Avenue to the south, and Massachusetts Avenue to the north. For purposes of this report, the Pope Branch subwatershed has been divided into Upper (A& B), Middle, and Lower (A&B) reaches (see Figure 1).

Figure 1: Pope Branch watershed and reaches

1.1 Geology and Soil Conditions

Pope Branch falls within the Atlantic Coastal Plain Province, roughly 8 miles east of the fall line, the boundary between the older rock formation of the Piedmont Province and the younger, unconsolidated sediments that comprise the Coastal Plain. These gravel, sand, and clay sediments, are the eroded materials from the Piedmont rocks.

The sediments of the Coastal Plain are associated with the Wilcomico Formation, the Patapsco Formation (Cretaceous Potomac Group and the Arundel Clay), the Miocene Calvert Formation, and Pliocene River deposits.

Where present, the sediments of the *Wilcomico Formation* consist primarily of gravel, sand, and silt. In some areas, deposits of carbonaceous clay, that contains fossilized woody debris, may also be found. This formation is roughly 30 feet in thickness, and can be found up to a maximum elevation of 140 feet.

Below the Wicomico Formation are soils from the Cretaceous-aged *Potomac Group*, associated with the *Patapsco Formation* and the Arundel clay. The upper portion of this formation consists of maroon clay and varicolored sands and clays. Beneath these soils, dark gray

massive clay containing fossilized wood and bone can be encountered. On average, this formation is 300 feet or less in thickness.

The soil groups found in the Pope Branch watershed include Christiana and Chillum silt loams, Galestown and Muirkirk loamy sands; Croom, Iuka, Keyport, Sassafras and Sunnyside sandy loams; and two Udorothent urban soils (fill).

Due to the highly developed nature of the watershed, many of these soils have been altered as a result of construction and the subsequent land disturbance. Therefore, many of the preceding soil groups are generally classified as urban land or fill.

1.2 Flow Characteristics

Pope Branch is a perennial, low gradient, warm water stream. The mean stream gradient is 2.6 percent, somewhat high for a Coastal Plain stream. A stream analysis report by the Metropolitan Council of Governments (COG) entitled "Pope Branch Subwatershed Restoration: 2002 Baseline Stream Assessment Study- Physical, Chemical and Biological Conditions" provides detailed information on water flow and stream channel dimensions. Measurements taken for this analysis found that mean cross sectional areas for the stream area as follows:

9.2 $ft.^2$ for Upper Reach A
42.3 $ft.^2$ for Upper Reach B
43.5 $ft.^2$ for Middle Reach
41.4$ft.^2$ for Lower Reach A
37.5 $ft.^2$ for Lower Reach B.

As the measurements show, there is a large difference between the uppermost portion of the stream and the lower portion, with considerable widening occurring as water moves downstream. This widening is primarily a result of increased water quantity that enters the stream via stormwater outfall drains.

During nonstorm events, baseflow measurements for Pope Branch taken during the summer of 2002 were 0.08 cfs; however; these recordings were made during a drought year, and it is likely that this number is 10-15% below the "normal" average. Additionally, it has been noted that Pope Branch baseflow may be partially augmented by the inflow of treated municipal water above Branch Avenue.

To help predict stormflow discharges, a stage-discharge rating curve was created by COG. This curve was based on 12 storm events and 35 discharge measurements. The following are the estimated discharge levels for different storm frequencies:

Weekly (0.25" rainfall/24 hours): ~17.4 cfs

One month (0.75" rainfall/24 hours): ~52.2 cfs
Six month (1.65" rainfall/24 hours): ~114.8 cfs
1-year (2.60" rainfall/24 hours): ~180.9 cfs
2-year (3.20" rainfall/24 hours): ~222.7 cfs
5-year (4.20" rainfall/24 hours): ~292.2 cfs

As these numbers show, the predicted flows can increase dramatically during a storm event, primarily as a result of the imperviousness of the watershed and the efficiency of the storm water conveyance system.

1.3 Water Quality

The basis for the water quality analysis of Pope Branch is derived from the District's 2002 Clean Water Act §305(b) Water Quality Report to U.S. EPA and Congress as well as the 2003 COG report.

According to the 2002 EPA report, the water quality of Pope Branch is influenced by the urbanized nature of its watershed. The presence of pathogens, organics, and toxic effects, primarily as a result of urban runoff and storm sewers, landfills, and also natural and unknown sources have the greatest influence on water quality. However, a review of dissolved oxygen, temperature, and pH data collected during the report period found no violations in water quality standards.

The 2002 COG study examined several water quality characteristics. Results from their sampling conducted from July-November 2002 found dissolved oxygen levels that violated DOH standards, a slightly acidic to neutral pH, and stream temperatures that were below Class 'C' (protection & propagation of fish, shellfish, and wildlife) thresholds. It is important to note that these measurements were taken during a drought year. The following is a summary of some of their major findings. More in-depth information can be found in the report.

Temperature: Water temperature in Pope Branch was monitored for roughly 111 days (from 5/24/02 to 9/12/02) in the middle and lower reaches. Overall, stream temperatures in these reaches fell below the DC Class 'C' standard (32.2 degrees Celsius). The middle reach was found to have the lowest temperature during summer periods, likely a result of its wide riparian buffer and canopy cover. Some temperature spikes were observed in response to stormflow inputs and high air temperature. Several temperature spikes were also observed as a result of water hydrant releases**.**

Baseflow Dissolved Oxygen: Dissolved oxygen (DO) levels violated DOH standards in both the Middle and Lower Reach, with 11 out of 27 samples being below the minimum 5.0 mg/L level recommended for supporting a healthy aquatic community.

Baseflow pH: A favorable pH range for most aquatic organisms is 6.5 to 8.0.

Levels ranged from 5.66 (slightly acidic) to 6.55 (near neutral), with an increase occurring in a downstream direction.

Baseflow Conductivity: Conductivity levels provide an idea of dissolved carbonates, chlorides, sulfates and other anions and cations present in the water column. Typical conductivity ranges for Coastal Plain streams in Maryland and other mid-Atlantic states is 60-160 µs/cm. Levels reported in the Pope Branch study varied among the different reaches and were found to have from 338 µs/cm to 354 µs/cm. Elevated levels could be a result of anthropogenic influences such as treated water leaking from a sewer line, road salting, and fertilizer application.

Baseflow Fluoride: Naturally occurring fluoride levels range from 0.1 to 0.2 mg/l. Fluoride levels in 0.07 mg/l to 0.69 mg/l. This very high level was recorded in Lower Reach b. The median concentration was 0.1 mg/l.

Middle Reach Baseflow Nitrate (No3), total phosphorous (TP), Iron (Fe), Copper (Cu), total organic carbon (TOC), biochemical oxygen demand (BOD):
No3: Concentrations were found to be in a moderate range (1.0-3.0 mg/1)
TP: Concentrations were found to be low (< 0.10 mg/l). The EPA has set a limit of 0.10 mg/l for the reduction and/or avoidance of nuisance plant growth.
Fe: Levels were below Class "C" 1.0 mg/l concentration for protection of aquatic life 100 percent of the time. (Class C criterion were developed by DC-DOH/EHA). Iron-oxidizing bacteria were observed in close proximity to seeps.
Cu: Concentrations of 4.0 ug/l were observed. These are well below the 13 ug/l limit set by the EPA
TOC: Levels were found to be slightly elevated
BOD: Levels ranged from below 2.0 mg/L to a high of 11.0 mg/L.

Middle Reach Stormflow NO3, TP, Fe, Cu, TOC, BOD:
During stormflow events, levels of NO_3 TP, Fe, Cu, and TOC were elevated. Surprisingly, stormflow BOD remained relatively stable, with a median recording of 4.25 mg/l. Copper (Cu) concentrations were found to increase by three times baseflow levels, with a range of 6.30 µg/l to 21.00 µg/l. According to EPA, copper levels should not exceed 13 µg/l to protect most aquatic organisms. Observed levels are reduced if water hardness is accounted for; however, levels of Cu may be toxic to the Pope Branch aquatic community.

The following chart summarizes observed baseflow and stormflow levels recorded at Pope Branch during July- November 2002 taken from Lower Reach 'A'. Observed measurements are based on 3-10 samples.

Parameter	Unit	Baseflow	Stormflow
DO	mg/l	5.48	-
Conductivity	(µs/cm)	338	-
pH	mg/l	6.27	-

Fl-	mg/l	0.30	-
NO3	mg/l	0.57	0.74
TP	mg/l	0.05	0.21
Fe	mg/1	0.54	1.95
Cu	µg/l	4.00	11.50
TOC	mg/l	3.30	7.00
BOD	mg/l	11	4.25

The evaluation of Pope Branch swimmable and secondary contact uses (recreation "in" and "on" the water, respectively) are based on surface fecal coliform data collected and compiled for a five-year span. According to the District's 2002 Report, Pope Branch did not support its swimmable use (200mpn/100ml) 69.2% of the time and its secondary contact use (1,000 mpn/100 ml), 46.2% of the time.

Photo 1: Example of erosion along Pope Branch

1.3.1 Stormwater

As mentioned in the 'Flow Characteristics' section, during rainfall events, water flow in Pope Branch increases significantly. This increased flow is a result of hydrologic modification, caused by urbanization, within the watershed. This increased stormwater flow has taken its toll on the habitat structure and water quality of Pope Branch. The erosion of its streambanks almost exclusively causes the chronic sedimentation of Pope Branch.

The driving force behind the physical, chemical, and biological degradation of Pope Branch is uncontrolled stormwater flows. The heavily urbanized nature of the watershed, and its subsequent imperviousness, create the conditions for highly flashy and intense flow conditions in the stream channel, even during the most moderate of storm events. As a result, Pope Branch has become wider and more incised. Figure 2 shows the location of stormwater outfalls within the Pope Branch and Ft. Dupont watersheds, as well as the location of some urban BMP's that have already been installed to address stormwater runoff concerns.

Figure 2: Location of stormwater outfalls and BMPs in Pope Branch and Ft. Dupont watersheds

1.3.2 Sewage Leaks

Raw sewage enters many urban streams, on a daily basis, through aging sewer lines. Where these lines cross or run adjacent to streams like Pope Branch they can be, and have been, undermined and stressed by stream down cutting. With time, this stress can lead to cracks that leak nutrient and fecal coliform rich sewage into streams. In Pope Branch, a leak from the active 12-inch sewer line that parallels the stream was observed to be leaking in January 2001. Repairs to this line were completed by April 2002; however, the potential for additional leaks to occur still exists due to the fact that the stream has begun to undercut

portions of the pipeline. These leaks can alter stream water quality, compromising the biological integrity of the stream, and making the stream unsafe for many human uses.

Currently, a substantial resolution to this waste treatment problem is being developed. Site meetings with the Water and Sewer Authority and EHA staff have now resulted in tentative plans to realign the sewer pipe paralleling Pope Branch to provide for a long-term solution to addressing potential sewage leaks.

1.4 Land Usage

The total drainage area for Pope Branch, excluding the piped portion, is 248.5 acres (if the piped portion is included, total area is 265.5 acres). Figure 3 shows an overview of open space and residential housing in the Pope Branch watershed.

Figure 3: Landuse within Pope Branch and Ft. Dupont watersheds.

Roughly 69.5 percent (28 percent) of the watershed consists of impervious surfaces, such as rooftops, roads/sidewalks, and parking lots (COG, 2003). The amount of impervious surfaces within the watershed is greatest within the lower reaches (an area of roughly 61.3 acres) of the stream, with roughly 40.4 percent of this area having impervious surfaces. In contrast, the upper reaches (108.4 acres) have 20.1 percent of impervious surfaces. As would be expected, the upper reaches have the highest percentage of deciduous forest cover, 46 percent, while the lower reaches have roughly 13.3 percent deciduous forest. The middle reach of the stream also falls in the middle in terms of impervious surfaces, with 29.3 percent and 22 percent deciduous forest. Table 1 provides a summary of these figures, along with housing percentages for each reach.

Reach	Acres	Impervious (building rooftops, roads, sidewalks) (%)	Deciduous Forest (%)	Residential Housing (partially included in impervious cover) (%)
Upper	108.4	21.8 (20.1 %)	50.5 (46%)	57.9 (54%)
Middle	78.8	23.0 (29.3%)	17.8 (22%)	61 (78%)
Lower	61.3	24.7 (40.4%)	8.2 (13.1 %)	53.1 (87%)
Total	**248.5**	**69.5 (28%)**	**76.5 (30.8%)**	**172 (69.2%)**

1.5 Biological Integrity

Assessment of the state of the aquatic and terrestrial habitats within the Pope Branch watershed is important in helping document the baseline conditions for restoration as well as

determining needed natural resource management activities.

1.5.1 Benthic Macroinvertebrates

The 2003 COG report should be referred to for detailed information regarding aquatic habitat. In summary; however, the investigators found that aquatic habitat (riffle substrate and pool quality) was fair (ratings apply to middle and lower portions only due to drought conditions in 2002). This rating was given as a result of the sub-optimal riffle substrate quality, moderate embeddeness levels, shallow depth of flow in riffle areas, and the presence of numerous fish barriers.

Macroinvertebrates are important members of the stream ecosystem. They help filter stream water, and provide nutrition for higher trophic levels. To assess the macroinvertebrate community present at Pope Branch, two 20-jab surveys and an RSAT voucher collection survey were collected in the middle and lower reaches during the spring, summer, and fall of 2002. The collected 20-jab samples were analyzed using seven metric calculations: 1) taxa richness, 2) total number of EPT taxa (individuals such as stoneflies, mayflies, and caddisflies that are primarily pollution intolerant groups), 3) percent Ephemeroptera (mayflies), 4) percent Tanytarsini, 5) Beck's Biotic Index, 6) number of scraper taxa, 7) percent clingers.

More detailed information regarding results from the sampling metrics can be found in the 2003 COG report. Overall; however, family-level identification of collected samples found that while some EPT taxa were found, they belonged to the more pollution tolerant families of these phylum. No pollution intolerant macroinvertebrate groups were found in Pope Branch. The most common macroinvertebrates were mosquitoes, midges, beetles, and aquatic worms, all classified as tolerant of pollution.

The 20 jab samples were used for MBSS macroinvertebrate IBI scoring evaluations. The scale for IBI used by adjoining jurisdictions was created to distinguish between streams with widely varying degrees of impairment. However, this scale loses its effectiveness when directly applied to DC streams, because unfortunately, the long-term effects of city-wide urbanization result in a cluster of scores at the poor end of the scale. In fact, the poor scores end up so tightly grouped that any attempt to prioritize watershed restorations based on these scores becomes an ambiguous task. As a result, the District will continue recording IBI using the regionally accepted scale primarily for the purposes of regional comparison. With that caveat, all reaches of Pope Branch received a 'Very Poor' score (<2.0). These streams are described by Stribling et al. (1998) as having a "strong deviation from the reference conditions, with most aspects of biological integrity not resembling the qualities of these minimally impacted streams, indicating severe degradation."

1.5.2 Fish

No electrofishing surveys have been conducted in Pope Branch due to the numerous fish blockages that are present. The only observed fish species present in Pope Branch is the American eel (*Anguilla rostrata*).

1.5.3 Terrestrial Habitat

As stated in Section 1.4, a significant portion of the landscape coverage in the watershed consists of single-family detached housing, a portion of which includes lawns and other landscaped areas that may provide food sources for insects, birds, and wildlife associated with residential areas.

The forested banks of Pope Branch serve as the largest contiguous area of terrestrial habitat within the watershed. A 1997 tree inventory of Pope Branch utilizing five temporary plots found that the dominant tree species was swamp white oak (*Quercus bicolor*), with white oak (*Quercus alba*), red oak (*Quercus cocina*), and red maple (*Acer rubra*) also found at the site. Overall, the trees were judged to be in good condition (location, contributions, and placement of tree are all favorable), although several were noted as fair or dead. The diameter for these trees ranged from 36 to 3 dbh, with an average dbh of 15.3.

The width of the riparian buffer varies throughout the Pope Branch Park, with the left bank of Pope Branch being wider and more heavily forested than the right bank. Additionally, the upstream and middle portions of the stream have the highest canopy cover.

Invasives: Several invasives are present within the Pope Branch Park. The most dominant invasive is English ivy (*Hedera helix*), a climbing evergreen vine that has begun to cover many of the trees within the park. Dense growth of this species can form a thick canopy that prevents sunlight from reaching other plants. Vines on a tree trunk can spread out to other trees, also preventing sun from reaching the leaves of the host tree. The plant has likely spread from the adjacent lawns, as English ivy is a popular landscaping groundcover. Presently, the total coverage is not known, but during field reconnaissance, it was noted that this invasive is less dense in the forested area of the upper reach.

Other invasives observed included Japanese knotweed (*Lonicera japonica*) and bamboo (*Bambusa sp.*). The former is a common invasive in riparian areas.

In addition to the negative biological impact invasives can have, some neighbors have expressed concern that the dense and bushy undergrowth of invasives encourages dumping of trash and represents a safety concern.

Wildlife: No studies currently exist on wildlife utilizing the Pope Branch Park or found within the subwatershed. It is assumed that species typically found within residential landscapes, such as birds that utilize edge habitats, squirrels, raccoons, and skunks would be found in the Pope Branch subwatershed.

2.0 VISION

Working with residents living within the Pope Branch watershed, numerous opportunities exist to involve the community in reconnecting with their local stream and inform them of beneficial actions they can take to reduce the quantity of water that enters Pope Branch and to improve its quality. Although it represents an important green space within the Southeast neighborhood, no watershed organizations or non-profits are actively involved with the stewardship of Pope Branch. By reducing stormwater runoff, restoring the stream, and strengthening connections and educating the public, Pope Branch Park has the potential to be restored to a quality community stream and park habitat. By comprehensively identifying and addressing the full range of issues concerning the stream, and the watershed as a whole, it is believed that the goals of an aesthetically appealing stream, parkland, and watershed will be achieved. To reach this goal, three interconnected primary activities are envisioned: **Stormwater Runoff Reduction**, **Targeted Outreach and Development of Community Watershed Stewards**, and **Stream Restoration**.

2.1 Vision of Stormwater Runoff Reduction

To address the issues of stormwater runoff, two primary tactics would be utilized: coordination with other DC government agencies involved in activities within the Pope Branch watershed and creation of an incentive program for citizens to utilize low impact development techniques (LID), such as rain gardens and rain barrels, in their yards.

Section 2.4 lists a number of agencies that are involved with projects or have facilities located within the Pope Branch watershed. Certain agencies represent logical choices to partner with for stormwater runoff. For example, working with the DC Department of Transportation to ensure that LID technology is utilized during road upgrades would be one way to reduce stormwater water runoff within the watershed. Other potential partnerships with listed agencies would be explored.

On the citizen-front, encouraging individuals to utilize LID techniques would help reduce runoff from roofs and driveways associated with residential housing. Appendix A lists some primary locations within the Pope Branch watershed to implement small-scale LID projects within communities. This incentive program would be part of the targeted outreach campaign in the watershed (see below).

2.2 Vision of Stream Restoration

In order to improve the aquatic and terrestrial habitat of Pope Branch stream, a comprehensive natural stream channel design is needed. This design should repair already eroded streambanks and be planned in such a way to accommodate increased flows to the stream that have led to the degradation. In addition to addressing erosion, the restoration would address fish passage obstruction and the health and width of the riparian buffer.

A restored stream would also improve the aesthetics of the stream and address community concerns, such as safety and public health.

2.3 Vision of Targeted Outreach and Development of Community Watershed Stewards

Pope Branch is located in Ward 7, the second most populous ward in the District. Based upon demographic analysis of the Pope Branch watershed (see Section 6), outreach should be provided in a form that reaches older community members, as this is the dominant age group in the watershed. These older, retired individuals may have more time to invest in volunteer projects or opportunities occurring in their neighborhood. Additionally, the high percentage of home ownership, coupled with high levels of employment and educational status point to a stable neighborhood setting. Due to the investment in their property, many homeowners may be supportive of projects that increase property values or beautify their neighborhood.

In the past, the Watershed Protection Division has focused primarily on environmental education targeted at youth, through teacher trainings and the Anacostia Environmental Fair. However, the development of an adult environmental education with outreach to watershed communities would help to begin to establish a core of informed citizens that could potentially serve as stewards, or friends group, of Pope Branch Park. An ongoing program to educate the public on the effects of urban NPS pollution on aquatic resources should be established. The program should encourage weekly or monthly volunteer activities within the watershed to help provide an ongoing focus on issues effecting the watershed and to establish a long-term presence of the WPD within the community.

Outreach to the following councils and organizations should help provide a strong initial base to disseminate information on Watershed Protection Division activities within the watershed and to create an information linkage from neighborhood "watchdogs" to the Watershed Protection Division.

2.3.1 Advisory Neighborhood Council

The Pope Branch subwatershed falls primarily within the Advisory Neighborhood Councils (ANC) 7A07 and 7B04 and 7B07. Based on meeting notes and community web pages, there appears to be several active neighborhood groups. One such group, the *Penn-Branch Citizens/Civic Association* serves the neighborhood adjacent to Pope Branch. This group was formed over 40 years ago to address neighborhood concerns such as water and sewer problems, lack of sidewalks and issues arising from the parks that surround the community. Recent projects have included installing a pocket park at the corner of Carpenter and O streets. Recent ANC notes have mentioned concerns over the installation of a sidewalk on Massachusetts Avenue that will result in the loss of ten feet of green space. The ANC also invited DC Greenworks to present information on their Tree Steward Program occurring in Wards 7 & 8. Other information on the website shows that concern has been expressed

over standing water and sediment washing into several residential streets.

In addition, the area appears to have a number of residents interested in gardening and beautification projects. This is evidenced by the well-maintained yards in the subwatershed, as well as various community beautification projects mentioned on the web pages.

2.3.2 DC Soil and Water Conservation Board

The DC Soil and Water Conservation Board representative for Ward 7 is Joseph Glover. Mr. Glover can share information regarding Watershed Protection activities, as well as community concerns regarding the Ward's natural resources.

2.3.3 Non-profit agencies

Marshall Heights Community Organization, Inc.

This community development group was founded in 1979. It is governed by a 63-member board and focuses on promoting and expanding economic opportunities within Ward 7. It is currently involved in a number of potential development areas.

Additional research will be conducted throughout the year to identify any other relevant non-profit organizations within the Pope Branch watershed.

2.4 Relevance to Regional and Local Initiatives

Within the District, there exist many agencies and non-profits whose actions could potentially impact Pope Branch or who, through improved coordination, the DC Watershed Protection Division could better ensure that issues related to nonpoint source water pollution are more fully addressed. In addition, as both the Potomac and Anacostia are tributaries that drain into the Chesapeake Bay, many of the activities supported by the Watershed Protection Division are tied to regional water quality initiatives.

To better coordinate activities with other government agencies, the WPD will establish a point of contact within different agencies that can ensure that the WPD is informed of any potential projects within the watershed (see Appendix B). The following provides information on the relevance of the Pope Branch restoration to the Watershed Protection Division's own nonpoint source management plan, as well as to other DC agency, regional agreements, and any relevant non-profit organizational missions.

2.4.1 DC Department of Health – Nonpoint Source Management Plan and Total Maximum Daily Loads (TMDLs)

Watershed Protection Division:

The Pope Branch stream restoration is an important component of the District of Columbia's June 2000 *Nonpoint Source Management Plan II*. The Pope Branch plan addresses goals for education and outreach, stream and riparian habitat restoration, and technology transfer. Because the science of urban stream restoration, particularly coastal plain stream restoration is still under development, the Pope Branch stream restoration is addressed in the NPS Management Plan II as a demonstration project / technology transfer.

Water Quality Division:

The Water Quality Division is responsible for the creation of TMDLs for the various tributaries within DC. According to a consent decree between the Water Quality Division, the EPA and Friends of the Earth, TMDLs for organics, bacteria, and metals were to be established in March 2003. As of July 2003, a TMDL for bacteria has been established, while extensions until August 29, 2003 have been granted for organics and metal. Once established, these TMDLs will provide further guidance for pollution reduction measures within the Pope Branch watershed.

2.4.2 DC Department of Parks and Recreation

Prior to 1973, Pope Branch Park was managed by the National Park Service; however, an agreement with The District transferred authority and management of the Pope Branch Park to the DC Department of Parks and Recreation (DPR). Due to declining budgets and a reduction in the DPR staff, regular management of the Pope Branch forested riparian buffers has been reduced. To help address staff shortages and to work to encourage the surrounding community to feel a connection to the surrounding and their parkland, the DPR is interested in working with community members to create a friends group. Working with interested community members, the DPR would work to identify a shared vision for the park and identify projects of high importance to the community. Formation of a group is in the early planning stages; however, the DPR is hoping to have community work days during the end of 2003.

Additionally, the USDA Natural Resources Conservation Service, in cooperation with the DC Department of Health, recently completed Phase I of a Soil Erosion Assessment of Parks and Recreation properties. This survey consisted of a preliminary site inventory and assessment of soil erosion problems on 87 recreation centers and parks managed by the DPR. During Phase I of this project, sites were ranked and prioritized with respect to severity of erosion and safety issues. Phase II will consist of completing a detailed erosion assessment for selected sites, which will include recommended solutions, soils analysis, and a cost estimate for repairs.

Phase I findings ranked Pope Branch Park on M Street from Fairlawn Avenue to Carpenter Avenue as a high priority project due to severe stream bank erosion. This erosion will be addressed in the natural stream channel design.

2.4.3 DC Department of Transportation

Opportunities exist for the Watershed Protection Division to coordinate with the Department of Transportation (DDOT) on encouraging the use of LID techniques and best management practices in the upgrading of many city streets.

Two projects occurring within the near future that are of interest to the WPD include the Pennsylvania Avenue, SE Transportation Study and DDOT's proposal to introduce a light rail system within DC, with portions of it running through the eastern portion of the Pope Branch watershed. DDOT is also working with the Department of Parks and Recreation to create commuting connections via a bicycle/pedestrian path to the end of the light rail.

2.4.4 DC Water and Sewer Authority

An exposed sewer line currently runs through a portion of Pope Branch. Further erosion will continue to compromise this line, creating the potential for leaks to occur. To prevent this, WASA, in coordination with the DC WPD will be realigning the sewer line. Re-alignment will occur upon completion of the stream restoration designs.

2.4.5 DC Public and Private Schools

No DC public schools are located directly within the Pope Branch watershed; however, the Randle Highlands Elementary School is located adjacent to the watershed boundaries at 30th & R Streets. This school is currently undergoing renovations.

One private school, Dupont Park, is located within the Pope Branch watershed at 3942 Alabama Avenue.

2.4.6 DC Community Housing and Development

Ward 7 neighborhoods falling within Cluster 34 (Twining, Fairlawn, Randle Highlands, Penn Branch, Fort Davis Park, and Fort Dupont) fall within the Mayor's Neighborhood Action program. Highlights of this campaign include streetscape improvements on Pennsylvania Avenue, upgrades to the Fort Davis Community Center and Randle Highlands elementary, and $7 million dollars for the *ReStore DC* commercial revitalization program. Another initiative, *Home Again: Renovating Our City's Abandoned Properties*, will focus on restoring abandoned and vacant lots.

2.4.7 DC Office of Planning

The DC Office of Planning has just recently completed an extensive planning document related to the restoration of the Anacostia River Waterfront. This initiative focuses on the need to improve the environmental health of the river as well as the economic health of the surrounding neighborhoods. Highlights of the initiative include creating a trail system along the Anacostia, restoring community connections to the river through improving access to

the stream and encouraging economic development in neighborhoods surrounding the river. The daylighting of both Pope Branch and Fort Dupont, a tributary of the Anacostia located to the north of Pope Branch, are included in this planning document as a means to improve the environmental health of the river.

2.4.8 National Park Service

The National Park Service is currently in the process of updating its General Management Plan for the Anacostia National Park. Two options are currently under consideration, one that highlights formalized recreational opportunities (playing courts, hard surfaces, etc.) in the Lower Anacostia Park, where the daylighting of Pope Branch is proposed, and another that provides for this area to be slated for natural resource management and passive recreational opportunities. The DC Department of Health, Watershed Protection Division has sent a formal letter to the National Park Service in support of the natural resource management option.

2.4.9 Chesapeake Bay 2000 Agreement

The restoration goals of Pope Branch tributary are closely aligned with those of the *Chesapeake Bay 2000 Agreement,* as signed by the District of Columbia, Virginia, Maryland, Pennsylvania, the Chesapeake Bay Commission, and the U.S. Environmental Protection Agency. The Pope Branch restoration strategy will support the goals of: "Living Resource Protection and Restoration" for fish passage, "Water Quality Protection and Restoration" for reduction of nutrient and sediment loads and for the protection of priority urban waters, "Sound Land Use" by encouraging neighborhood revitalization and by increasing stewardship of natural resources through public education and community engagement.

Through coordinating activities with various District agencies and community organizations, a more comprehensive plan to address the full spectrum of restoration needs in the watershed can be created. As a result, each individual component will support the success of the entire effort so that the stream and park ecology can return to a sustainable state.

3.0 IMPLEMENTATION STRATEGY

There are a series of steps that need to be undertaken to correct the current problems facing Pope Branch tributary and to correct its further degradation. By implementing the larger-scale activities listed in Section 2.0, it is believed that significant water quality, habitat and park improvements in Pope Branch may be achieved to attain the District of Columbia water quality class B and class C designated use categories for the stream, and to improve the watershed as a whole. A full description of the activities, and the goals and objectives associated with them follows.

3.1 Implementation of the Stormwater Runoff Reduction Strategy

Goal #1: Work with DC government agencies, local organizations, and citizens located within the Pope Branch watershed to reduce the volume and improve the water quality of storm water flowing into the stream through encouraging the use of BMPs and LID design.

Objective 1: Identify and rank priority sites within the Pope Branch watershed for potential LID implementation.
Measurement: Site identification and ranking
August 2004 Milestone: *List of targeted properties and action plan for two high priority projects.*

Objective 2: Provide community organizations within the Pope Branch watershed with information relating to Watershed Protection Division activities.
Measurement: Number of organizations contacted and number of ANC meetings attended.
August 2004 Milestone: *Contact 7 organizations and attend three ANC meetings.*

Objective 3: Install LID neighborhood demonstration projects.
Measurement: Number of LID project installed.
August 2004 Milestone: *Install one rain garden and conduct one rain barrel outreach program.*

Objective 4: Identify ongoing development projects headed by other DC agencies where LID could be implemented.
Measurement: List of projects.
August 2004 Milestone: *Initiate discussions with two DC agencies on two projects.*

Objective 5: Ensure proper BMP installation for ongoing development projects.
Measurement: Number of BMP's installed
August 2004 Milestone:

3.2 Implementation of the Stream Restoration Strategy:

Goal #2: Reduce nonpoint source loads through the redesign the stream channel using natural channel design. Design will address the issues of stormwater runoff and the resulting accelerated land and streambank erosion and work to restore bank integrity, water quality, and habitat quality.

**Note: the timeline for this project has been put on hold due to current lack of funding available through the Army Corps of Engineers. The WPD is currently analyzing other funding possibilities.

Objective 1: Improve streambank stability and reduce streambank erosion through natural channel design.

Based upon initial cost estimates for restoring Pope Branch, the Department of Health, Watershed Protection Division chose to enter into partnership with the Army Corps of Engineers to receive additional funds for the project through cost-sharing mechanisms. The Army Corps of Engineers, in partnership with the Department of Health, Watershed Protection Division is the lead agency responsible for the design and construction of the stream channel design for Pope Branch.

Due to this partnership, project implementation has been delayed as a result of a number of feasibility studies and project review processes that the Army Corps must complete prior to approving projects. While the Pope Branch stream restoration project had originally been scheduled for completion in 2003, this timeline as been revised. Funds for this project cannot be transferred to the Army Corps until a Partnership Cooperative Agreement (PCA) is signed. Based upon a timeline submitted to the WPD in July 2003, the following are the expected dates for the PCA and other deliverables related to the stream restoration:

See Note: Draft Feasibility Report submitted to the North Atlantic Division: August 30, 2003

Finalize Feasibility Report:	October 2003
Plans and Specifications:	August 2004
Project Approval:	September 2004
PCA Execution:	September 2004 (may potentially be executed earlier in Jan. 2004)
Construction Award:	October 2004
Construction Complete:	July 2007 (this will include project monitoring)

Measurement: Number of stream miles restored, through measurement in reduction in streambank erosion (see Objective 2)
August 2004 Milestone: *Creation and review of stream channel design plans*

Objective 2 Establish bank erosion pins to measure reductions in stream bank erosion before and after stream channel redesign.
Measurement: Pounds/acre of eroded soil

August 2004 Milestone: *Installation of bank erosion pins and initial measurements*

Objective 3: Improve Pope Branch water quality
Measurement: Physical and biological water quality parameters
August 2004 Milestone: *Establish TMDLs and benchmarks for improved water quality*

Objective 4: Restore in-stream habitat through removal of fish passages and sediment load reductions.
Measurements: Number of fish passages removed.
Assessment of aquatic habitat.
Bank erosion pin data.
August 2004 Milestone: *Design highlighting areas for fish passage removal*

Objective 5: Following stream restoration activities, reintroduce anadromous and resident fish populations.
Measurement: Number of fish species reintroduced. Conducted yearly monitoring to assess survivorship.
August 2004 Milestone: *Comprise list of historic fish populations and habitat requirements.*

Goal #3: Realign existing sewer line as part of the stream channel redesign to ensure that the line is no longer compromised by natural stream meandering.

Objective 1: Work with WASA to coordinate sewer upgrade plans with stream restoration implementation.
Measurement: Sewer design that is compatible with restoration plans.
August 2004 Milestone: *Review proposed sewer design.*

Goal #4: Expand riparian forest buffer and protect the existing buffer from the impacts of invasives.

Objective 1: Identify areas within Pope Branch Park for riparian plantings and conduct tree plantings.
Measurement: Number of trees and species planted
August 2004 Milestone: *Plant 100 trees along riparian buffer with the assistance of local community.*

Objective 2: Delineate extent of invasive spread in Pope Branch Park
Measurement: Acreage covered by 50% invasive species
August 2004 Milestone: *Using GPS/GIS, document current invasive coverage*

Objective 3: In conjunction with the DC Department of Parks and Recreation, conduct volunteer workdays to remove invasives.
Measurement: Number of volunteer hours
August 2004 Milestone: *200 volunteer hours devoted to Pope Branch Park invasive removal.*

3.3 Implementation of the Targeted Community Outreach and Development of Community Watershed Stewards Strategy

Goal #5: Promote citizen involvement in restoration to help provide for the long-term protection of Pope Branch natural resources.

Objective 1: Based on watershed demographics and observations, create materials that are age and interest appropriate.
Measurement: Number of outreach materials distributed
August 2004 Milestones: *In conjunction with the Department of Parks and Recreation, create outreach materials for a Pope Branch Friends group.*
Conduct two trainings on gardening techniques that have a beneficial impact on water quality.

Goal #6: To ensure relevance of outreach program and other watershed activities, conduct a yearly assessment of WIP implementation strategy and use adaptive management to update and revise management strategies, if necessary.

Objective 1: Review WIP and attained objectives. Update objectives on a yearly basis to reach targeted completion date.
Measurement: Revised WIP
August 2004 Milestones: *Review WIP to determine number of milestones meet and restrategize based upon implementation results.*

3.4 Maintenance and Monitoring

For goals and objectives related to the stream restoration design, detailed monitoring will occur for five years following project implementation. Parameters studied will mirror those examined in the pre-implementation study conducted by COG and will consist of an examination of the macroinvertebrate community, water quality testing, water flow and measurement of streambank erosion (via streambank pins). In conjunction with this detailed monitoring, monitoring by the Department of Health's Water Quality Division will continue on a yearly basis and extend beyond the five-years of monitoring for the restoration project.

Riparian cover and invasives will be monitored at 1, 3, and 5 years and will continue based upon funding availability.

Educational programs will be evaluated, where applicable, following implementation and will consist of a pre and post participant survey. Responses will be used to revise programs and ensure that the Watershed Protection Division is conveying information on stormwater runoff, water quality, and stream restoration in a format that is accessible to the general public. Additional means of monitoring educational programs includes: number of participants at outreach programs, number of participants requesting rain barrels, and number of rain gardens installed by residents within the Pope Branch watershed.

4.0 PROJECTED SOURCE LOAD REDUCTIONS

Based upon the latest numbers for load reductions as supplied by the EPA Chesapeake Bay Program technical review group, the following represent the expected load reductions that could be achieved by implementing the actions presented in this document.

Pope Branch Stream Restoration:

The proposed restoration project would restore 7,231 feet of streambank. This restoration has the following load reduction estimates, based on the listed efficiencies:

Nitrogen		**Phosphorus**		**Sediment**	
Efficiency	*Reduction (lbs/yr)*	*Efficiency*	*Reduction (lbs/yr)*	*Efficiency*	*Reduction (lbs/yr)*
0.02	**145**	0.00035	**25**	2.55	**18,440**

Pope Branch Low Impact Development (LID) Sites:

Potential LID sites were identified within the Pope Branch watershed (see Appendix A). The drainage area that would be captured by implementation of LID design was measured and used to calculate efficiencies for these potential sites. The following table provides information on area and load reduction for LID within Pope Branch.

			TN		**TP**		**TSS**	
Location	**BMP Type**	**Acres**	**Load (lbs/yr)**	**Rdx (lbs/yr)**	**Load (lbs/yr)**	**Rdx (lbs/yr)**	**Load (lbs/yr)**	**Rdx (lbs/yr)**
Dupont Park 7th Day Adventist Church – Mass Avenue	Bioretention Cell	0.434	55	**22**	7	**4**	207	**175**
Dupont Park School – 3942 Alabama Avenue	Bioretention cell	0.37	47	**19**	6	**4**	177	**150**
Church of Jesus Christ	Bioretention cell	0.56	71	**28**	9	**6**	268	**227**
Mass Ave from Ala to Minn	Infiltration trench	5.45	592	**346**	89	**63**	2605	**2344**
Branch & O Street	Bioretention cell	0.557	71	**28**	9	**5**	266	**226**
Spin Cycle parking lot- O & Pennsylvania	Bioretention cell	0.357	45	**18**	6	**4**	171	**145**
3320 Pennsylvania Ave. parking lot	Bioretention cell	1.34	170	**68**	22	**13**	640	**544**
Pennsylvania Ave. Baptist church parking lot	Bioretention cell	1.05	133	**53**	17	**10**	502	**427**
Pennsylvania & Westover	Infiltration strip	0.8	102	**51**	13	**9**	382	**344**
38th & Carpenter	Bioretention cell	0.169	21	**9**	3	**2**	81	**69**

1639 to 1651 38th St.	Bioretention cell	0.169	21	**9**	3	**2**	81	**69**
Ft. Davis Drive	Infiltration trench	2.29	291	**145**	38	**26**	1094	**930**
3849 Alabama Avenue parking lot	Bioretention cell	0.624	79	**32**	10	**6**	298	**253**
33rd & Ft. Davis Park (runoff from Alabama Avenue)	Bioretention cell	0.438	56	**22**	7	**4**	209	**178**
Threrapeutic Rec Center parking lot : 31st & G	Bioretention cell	0.324	41	**16**	5	**3**	155	**132**
30th & Massachusetts	Bioretention cell	1.15	146	**58**	19	**11**	550	**467**
M Place (between Fairlawn & Minnesota)	Bioretention cell	0.634	80	**32**	10	**6**	303	**258**
M Street (between Fairlawn & Minnesota)	Bioretention cell	0.634	80	**32**	10	**6**	303	**258**
Total		17.35	2201	**988**	283	**184**	8292	**7128**

5.0 DELIVERABLES, TIMETABLE, and BUDGET

This section will be augmented with a Microsoft Project spreadsheet. A general outline follows for the Pope Branch Watershed Implementation Strategy Activities.

Objectives	August 2004 Deliverables	Objective Completion Date	Budget	Notes
Goal 1: Work with DC government agencies, local organizations, and citizens located within the Pope Branch watershed to reduce the volume and improve the water quality of storm water flowing into the stream through encouraging the use of BMPs and LID design.				
1.1 Identify and rank priority sites within the Pope Branch watershed for potential LID implementation.	List of targeted properties and action plan for two high priority projects.	**August 2004**	**FY 2004 319 grant**	
1.2 List of targeted properties and action plan for two high priority projects.	Contact 7 organizations and attend three ANC meetings.	**August 2005**		
1.3 Install LID neighborhood demonstration projects.	Install one rain garden and conduct one rain barrel outreach program.	**August 2004**		
1.4 Identify ongoing development projects headed by other DC agencies where LID could be implemented.	Initiate discussions with two DC agencies on two projects.	**Ongoing**		
1.5 Ensure proper BMP installation for ongoing development projects.		**Ongoing**		
Goal 2 Reduce nonpoint source sediment loads through the redesign the stream channel using natural channel design. Design will address the issues of accelerated land and streambank erosion and work to restore bank integrity, water quality, and habitat quality.				
2.1 Improve streambank stability and reduce streambank erosion through natural channel design.	Creation and review of stream channel design plans	**July 2007**	Plans: Nonpoint Source Base Program Construction: NI00 $141,400 Implementation: NI00 - $100,000 NI01 - $137,400 NI02 - $190,000 Post-Implementation Monitoring: Nonpoint Source Base Program	

2.2 Establish bank erosion pins to measure reductions in stream bank erosion before and after stream channel redesign.	Installation of bank erosion pins and initial measurements	**July 2007**		
2.3 Improve Pope Branch water quality	Establish TMDLs and benchmarks for improved water quality	**Ongoing- TMDLs August 2003**		
2.4 Restore in-stream habitat through removal of fish passages and sediment load reductions	Design highlighting areas for fish passage removal	**July 2007**	Implementation funding (see above)	
2.5 Following stream restoration activities, reintroduce anadromous and resident fish populations.	Comprise list of historic fish populations and habitat requirements.	**July 2007, although dependent upon achieved water quality improvements**	Implementation funding (see above)	
Goal 3: Realign existing sewer line as part of the stream channel redesign to ensure that the line is no longer compromised by natural stream meandering.				
3.1 Work with WASA to coordinate sewer upgrade plans with stream restoration implementation.	Review proposed sewer design.	**October 2004-2005**	Implementation funding (see above**)** and funding from WASA	
Goal 4: Expand riparian forest buffer and protect the existing buffer from the impacts of invasives.				
4.1 Identify areas within Pope Branch Park for riparian plantings and conduct tree plantings.	Plant 100 trees along riparian buffer with the assistance of local community.	**Ongoing**		
4.2 Delineate extent of invasive spread in Pope Branch Park	Using GPS/GIS, document current invasive coverage	**August 2004**		
4.3 In conjunction with the DC Department of Parks and Recreation, conduct volunteer workdays to remove invasives.	200 volunteer hours devoted to Pope Branch Park invasive removal.	**Ongoing**		
Goal 5: Promote citizen involvement in restoration to help provide for the long-term protection of Pope Branch natural resources.				
5.1 Based on watershed demographics and observations, create materials that are age and interest appropriate.	In conjunction with the Department of Parks and Recreation, create outreach materials for a Pope Branch Friends Group. Conduct two	**August 2004** **August 2004**	NI00 - $25,000 NI01 - $10,000 NI02 - $10,000	

	trainings gardening techniques that have a beneficial impact on water quality.			
Goal 6: To ensure relevance of outreach program and other watershed activities, conduct a yearly assessment of WIP implementation strategy and use adaptive management to update and revise management strategies, if necessary.				
5.2 Review WIP and attained objectives. Update objectives on a yearly basis to reach targeted completion date.	Review WIP to determine number of milestones meet and restrategize based upon implementation results.	**August 2004**		

6.0 DEMOGRAPHICS

Census information for the Pope's Branch subwatershed was taken from Census Track 99.01 (see Figure 2). This area was seen as appropriate for determining some of the general demographics of the area, such as racial composition, home ownership, employment income levels, and age.

Of the residents in this tract, 2,269 are of one race, with 2,161 (95%) being African American. The racial composition of the remaining population is white (4%), American Indian/Alaskan Native (0.3%), Native Hawaiian/Pacific Islander (0.1%), or some other race (0.3%). Thirty-three residents (1.4%) consider themselves of two or more races. Additionally, 1.3% of the population is Hispanic (considered independent of race).

Housing in the Pope Branch watershed consists primarily of single-family detached residences. The majority of the available housing units (94.4%) are occupied. Additionally, many of these units are owned by the residents (85.5%) rather than rented (14.5%).

Based upon employment statistics, the residents of the neighborhood who are eligible for employment (over 16 years of age) are either in the civilian labor force (50.7%) or not in the labor force (45%), with only 4.3% of residents being listed as unemployed. Employed residents are primarily in the management/professional field (47.4%) or sales and office occupations (30.1%). Educational, health and social services is the most common industry (23.5%), followed by public administration (17.6%). The median household income for the area is $61, 174. Few residents (4.3%) are below the poverty level. Most have high school degrees or above (88%).

Family households are common in this census tract (66%), those with individuals under 18 years represent 21% of these households; those with individuals 65 years and over comprise 42%. The median age for residents is 50, and the age range of 45-54 represents 16.4% of the population.

7.0 CONCLUSION

Tremendous potential exists within the Pope Branch watershed. While constraints to implementation can be found within every watershed, through highlighting potential areas of opportunity, it is hoped that residents will be encouraged to play a more active role in the care and protection of the natural resources within their watershed. As the DC Watershed Protection Division moves forward with the natural channel design for their local stream, efforts will be made to inform and include community members of the planned restoration strategies. In addition, the WPD will continue to work to encourage individuals to take a more proactive attitude towards their surrounding environment. Through providing workshops and demonstration projects, the DC WPD can assist in the formation of a Friends Group for Pope Branch to help ensure that the health of the stream is maintained well beyond the initial redesign of the stream corridor. This involvement, it is hoped, will lead to the development of a more innovative and holistic management within the watershed.

8.0 REFERENCES

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Appendix A: Potential Sites for LID Implementation within the Pope Branch Watershed

The following represent sites identified by the Watershed Protection Division staff as locations that could be used for the implementation of LID technology. The table provides information on the location, size, feasibility, and ranking of each site. As the WPD moves forward with encouraging the installation of LID within each watershed, this table can be referred to as a means of deciding the best areas for initial investment.

Facility & Address	**Type**	**Area treated (in sq. ft. and acres)**	**Feasibility**	**Notes**	**Priority Ranking (Low, Medium, High)**
Dupont Park 7th Day Adventist Church Massachusetts Avenue	-roofspout disconnection -bioretention on side street -bioretention above building (alleyway)	18,900 ft^2 0.434 acres	Medium – High. Would need to work with church.	Bioretention would require excavation	High Area collects runoff from alleyway with lots of parking.
Dupont Park 7th Day Adventist School 3942 Alabama Avenue	LID in parking lot	16,122 ft2 0.370 acres	Medium		Low
Church of Jesus Christ	**LID in parking lot.**	**24,409 ft2** **0.56 acres**	**High**	**Have a current drainage problem** ***Contact: Darenda Downing & Charlene Belton***	**High**
Massachusetts Avenue (from Alabama to Minnesota Avenue)	-Bioretention cells along length of street -Biocells at stormdrains	237,600 ft2 5.45 acres	Low	Road has recently been upgraded.	Medium
Bottom of 34th &	Tree planting	N/A	Low	Too many	Low

35th St.				drains on 34th Street for LID to feasible. Good spot for tree planting and landscaping	
Branch & O St.	Bioretention cell (2 storm drains present)	24,255 ft2 0.557 acres	Low	New curbs just installed	Low
Spin Cycle Coin Laundry and Police Barracks parking lot, O & Pennsylvania	LID in upper parking lot	15,561 ft2 0.357 acres	Medium		Medium
DC WASA/ Municipal Services Government Building, 3320 Pennsylvania	**LID in parking lot**	**58,332 ft2** **1.34 acres**	**High**	**Would be good demonstration project for DC government building. *May not fall entirely within Pope Branch watershed.***	**High**
Pennsylvania Baptist Church parking lot	**LID in parking lot**	**45,873 ft2** **1.05 acres**	**High**	**Connect to drain on O & 30th**	**High**
Pennsylvania and Westover	Long biocell	34,848 ft2 0.8 acres	Medium	Some bioretention on grade of heavily sloped street	Low
Randle Highlands elementary school	LID incorporated into renovation		Medium	School adjacent to Pope Branch watershed. Renovations almost complete	Medium - Low
38th & Carpenter	Bioretention on left side of 38th.	7,362 ft2 0.169 acres	Medium	Also potential area for tree planting.	Low (High for trees)

1639 to 1651 ½ 38th St.	Bioretention in some grassy areas.	8,928 ft2 0.205 acres	Medium	Also potential area for tree plantings	Low (High for trees)
Ft. Davis Drive	Bioretention	99,742.61 ft^2 2.29 acres	Medium	Currently vegetated swale, could add soil amendments. Underdrain currently exists	Low
3849 Alabama Avenue shopping lot. (DC Dept. of Human Services)	LID in parking lot	27,187.50 ft^2 0.624 acres	Medium	Good grade and has lots of islands that could be used (curb cuts)	Medium-High Couldn't find drain.
33rd & Ft. Davis (Ft. Davis Park area- runoff from Alabama Avenue)	**Bioretetion cells in Ft. Davis Park**	**19,089 ft2** **0.438 acres**	**High**	**Large open space with drain.**	**High**
Therapeutic Center, 31st & G	Small biocell near front of parking lot	14,112 ft2 0.324 acres	High		Medium
30th & Massachusetts	Biocell at bottom of Mass. Avenue.	50,049 ft2 1.15 acres	High	Current drain in grassy area behind barrier, near railroad line. Need to check with DDOT on Light Rail.	Medium - High
M Place (between Fairlawn and Minnesota)	**Biocell near Fairlawn in Pope Branch Park and riparian plantings**	**27,601 ft2** **0.634 acres**	**High**	**Have spoken with neighbors . Good landscaping opportunity for park.**	**High**
M St. and Fairlawn	Biocell with underdrain into Pope Branch	27,601 ft2 0.634	High		Medium

Appendix B: Pope Branch Contact List

Organization	Contact Name	Number	Email
Advisory Neighborhood Council	Dolly Davis-ANC 7A	202-581-2707	dcdolly@aol.com
DC Soil & Water Conservation Board	Joseph Glover 1215 33rd Place SE Washington, DC 20019		jagbfree@myexcel.com
DC Water Quality Division	Nicoline Shutterbrant		Nicoline.shutterbrant@dc.gov
DC Department of Parks and Recreation	Michael Lucy	202-673-7681 202-997-0851-cell	Michael.lucy@dc.gov
DC Department of Transportation	Allen Miller	202-671-4678	Allen.miller@dc.gov
DC Public Schools	Donna Ellis-Design Mgmt		Donna.Ellis@k12.dc.us
DC Community Housing & Development			
DC Office of Planning	Aubrey Thagard		
DC Water and Sewer Authority	John Trypus DC WASA 5000 Overlook Ave, SW Washington, DC 20032	202-787-2406	John.Trypus@dcwasa.com
National Park Service	Stephen Syphax National Capital Parks – East 1900 Anacostia Drive, SE Washington, DC 20020	202-690-5160	Stephen_syphax@nps.gov